III. AMENDMENTS TO THE SPECIFICATION

On Page 1, please change the title of the invention:

~~Optical Pickup, and Optical Disc Drive~~

OPTICAL DISC DRIVE FOR PERFORMING READ/WRITE OPERATIONS AND OPTICAL DISKS

On Page 1, after the title of the invention, please insert the following.

RELATED APPLICATION

This application is a continuation of application Serial No. 09/511,893, filed on February 23, 2000.

On Page 1, the paragraph beginning at line 5:

The present invention relates to an optical disc drive, and more particularly to an optical disc drive adapted to write data to, and/or read data from, ~~any of~~ optical discs being different in format from each other, such as a compact disc (CD), digital video disc or digital versatile disc (DVD), etc. According to the present invention, a plurality of light sources is disposed apart from each other radially of such an optical disc and a laser light is emitted from one of the light sources selected according to ~~an~~ the type of optical disc loaded in the optical disc drive towards the optical disc and focused through a common optical system for the different types of optical discs. Thus, a single optical pickup can be used in common with such a plurality of optical discs without any deterioration of the optical property.

On Page 2, the paragraph beginning at page 5:

It is considered that using such an optical integrated device to build the optical pickup also in ~~a~~ an optical disc drive for DVD, a so-called DVD player, for example, the DVD player can be designed compact and simple. A DVD player designed to write data to, and/or read data from, a CD as well will be very conveniently usable.

On Page 2, the paragraph beginning at page 14:

When the optical integrated device is constructed as in the above and an objective lens is ~~used~~ commonly used with both DVD and CD, either of the light source for DVD or that for CD will be disposed off the optical axis of the objective lens. The laser beam emitted from the light source thus disposed off the optical axis will be incident obliquely to the objective lens. As a result, the obliquely incident laser beam will have an increased aberration and thus the optical property will be deteriorated.

On Page 3, the paragraph beginning at page 21:

According to the present invention, there is provided an optical disc drive adapted to read information from an optical disc by emitting a laser beam from a selected one of a plurality of light sources disposed apart from each other radially of the optical disc and focusing the laser beam on the optical disc, detecting a return light resulted from reflection of the laser beam at the optical disc and processing the result of return light detection, the optical disc drive including:

a common optical system for irradiating the laser beam emitted from the selected one of the plurality of light sources to the optical disc; and a moving means operative in response to ~~an~~ a laser beam output from the selected light source to move all or a part of the optical system radially of the optical disc.

On Page 7, the paragraph beginning at line 10:

The CD 2B is an optical disc from which recorded data can be read by irradiating a laser beam to an information recording surface of the disc through a transparent substrate of 1.2 mm in thickness and processing a return light from the information recording surface. The DVD 2A is an optical disc having information recorded therein with a higher density than ~~n~~ the CD 2B and from which recorded data can be read by irradiating a laser beam to an information recording surface of the disc through a transparent substrate of 0.6 mm in thickness and processing a return light from the information recording surface.

On Page 9, the paragraph beginning at line 1:

The astigmatism correction plate 50 is a transparent parallel flat plate and it is disposed in the optical path of the laser beam and obliquely in relation to the optical axis of the laser beam. The astigmatism correction plate 50 is equal in astigmatism to the laser beam. Its gradient, thickness, etc. are selected to provide an astigmatism which will cancel that of the laser beam. Thus, the astigmatism correction plate 50 corrects the astigmatism of each of the laser beams which are different in wavelength from each other.

On Page 10, the paragraph beginning at line 4:

The objective lens 7 is an aspheric plastic lens formed from a transparent resin by ~~injecting~~ injection molding. By selecting an appropriate refractive index of the transparent resin and shape of the lens surface, the objective lens 7 is formed to focus the incident parallel laser beam for DVD or CD onto the information recording surface of the optical disc 2A or 2B. Thus, the objective lens 7 is formed as a so-called bifocal lens for both the laser beams for DVD and CD, respectively.

On Page 10, the paragraph beginning at line 10:

Further, the objective lens 7 is movable by a tracking control actuator 8 composed of a voice-coil motor radially of the optical disc 2A or 2B so that tracking control can be done by driving the actuator 8 ~~correspondingly~~ corresponding to a tracking error signal.

On Page 10, the paragraph beginning at line 14:

Also, the objective lens 7 is movable by a focus control actuator (not shown) along the optical axis of the laser beam so that focus control can be done by driving the focus control actuator ~~correspondingly~~ corresponding to a focus error signal.

On Page 10, the paragraph beginning at line 17:

When not forced by the tracking control actuator 8, the movable objective lens 7 will be positioned for the optical axis thereof to be aligned with that of the DVD laser beam while the optical axis of the objective lens 7 will not be aligned with that of the CD laser beam. When reading the CD 2B, the objective lens 7 is moved by the tracking control actuator 8 radially of the CD 2B ~~correspondingly~~ corresponding to the spacing between the light sources in the optical integrated device 4, whereby the optical property of the optical system is prevented from being deteriorated when reading the CD 2B.

On Page 14, the paragraph beginning at line 18:

The light-incident surfaces 25B and 26B for the CD are formed side by side tangentially to the circumference of the CD to have a general shape of a rectangle, and each is divided radially of the CD by a parting line extending tangentially to the circumference of the CD. Thus, when the optical head is just on an intended track on a CD, each of the light-incident surfaces 25B and 26B can detect a beam spot defined thereon and quartered radially of the CD. Namely, a result of light detection by each of the quartered light-incident surfaces is provided as output. In FIG. 4, the outer light-incident surface divisions at the front-side portion are indicated with references *m* and *p*, respectively, while the inner ones are indicated with references *n* and *o*, respectively. The outer light-incident surface divisions at the rear-side portion are indicated with references *q* and *t*, respectively, while the inner ones are indicated with references *r* and *s*, respectively.

On Page 15, the paragraph beginning at line 9:

The light-incident surfaces 25A and 26A for DVD are formed side by side tangentially to the circumference of the optical disc 2A in the similar manner to that for the light-incident surfaces 25B and 26B to have a general shape of a rectangle. The light-incident surface 26A at the rear-side portion is formed similarly to the light-incident surface 26B at the rear-side portion for the CD.

On Page 15, the paragraph beginning at line 14:

The light-incident surface 25A at the front-side portion is formed similarly to the light-incident surface 25B at the front-side portion for the CD, and further it is divided by two tangentially to the circumference of the optical disc. Thus, the semiconductor substrate 17 can produce a tracking error signal by the so-called differential phase detection (DPD). As shown in FIG. 4, the outer and on-slope light-incident surface divisions for DVD at the front-side portion are indicated with references *a* and *d*, respectively, and the inner and under-slope light-incident surface divisions at the front-side portion are indicated with references *b* and *c*, respectively. Further, the outer and off-slope light-incident surface divisions at the front-side portion are indicated with references *e* and *h*, respectively, and the inner and off-slope light-incident surface divisions at the front-side portion are indicated with references *f* and *g*, respectively. Also, the outer light-incident surface divisions at the rear-side portion are indicated with references *i* and *l*, respectively, and the inner light-incident surface divisions at the rear-side portion are indicated with references *j* and *k*, respectively.

On Page 17, the paragraph beginning at line 21:

In the optical disc drive 1 constructed as having been described in the foregoing with reference to FIG. 1, the optical pickup 3 irradiates a laser beam to the optical disc 2A or 3B and detects a return light from the optical disc, and a selected one of the signal processing circuits processes the result of the return light detection, thereby reading information from the optical disc 2A or 2B.

On Page 18, the paragraph beginning at line 20:

When the optical disc (2A or 2B) loaded in the optical disc drive 1 is a DVD (namely, 2A), one of the semiconductor laser diode chips 15A and 15B disposed side by side in the optical integrated device 4 radially of the optical disc 2A or 2B (see FIG. 3), that is, the semiconductor laser diode chip 15A, is selected to emit a laser beam towards the DVD 2A, and a return light from the DVD 2A is detected by the light-incident surfaces 25A and 26A for the DVD via the prism 14.

On Page 19, the paragraph beginning at line 8:

On the contrary, when the optical disc loaded in the optical disc drive 1 is the CD (namely, 2B), the semiconductor laser diode chip 15B (see FIG. 3) is selected to emit a laser beam towards the CD 2B, and a return light from the CD 2B is detected by the light-incident surfaces 25B and 26B for the CD via the prism 14.

On Page 19, the paragraph beginning at line 17:

The deteriorations of optical property were actually observed using various signals produced by the matrix calculation circuit 9. As the results of the observation showed that when the objective lens 7 is not moved at all, there took place in the tracking error signal TE a deviation of the S-characteristic from the one for the just tracking. When the collimator lens 5 had a focal distance of 23 mm and a distance of 6.176 mm was provided between the collimator lens 5 and objective lens 7, the deviation of the S- characteristic from the just-tracking one could be prevented by moving the objective lens 7 towards the semiconductor laser diode chip for the CD.

On Page 20, the paragraph beginning at line 5:

The moving distance of the objective lens 7 varies in proportion to the ratio between the focal distance of the collimator lens 5 and the distance between the collimator 5 and objective lens 7. By increasing the distance between the collimator lens 5 and objective lens 7 in comparison with the focal distance of the collimator lens 5, the objective lens 7 can be moved away from the semiconductor laser diode chip for the CD, so that the deviation of the S-characteristic from the just-tracking one can be prevented. Also, when the focal distance of the collimator lens 5 is set equal to ~~that~~ the distance between the collimator lens 5 and objective lens 7, it is possible to prevent the S-characteristic from deviating from the just-tracking one without the necessity of moving the objective lens 7. In this case, however, the design of the objective lens 7 being a bifocal lens will be complicated.

On Page 21, the paragraph beginning at line 3:

Note that the laser beam for the CD is focused on the compact disc 2B with the diameter thereof limited and the numerical aperture reduced by the aperture 6.

On Page 21, the paragraph beginning at line 5:

The return light resulted from reflection of the laser irradiated to an optical disc is incident upon the light-incident surfaces 25A and 26A for the DVD and those 25B and 26B for the CD (as in FIG. 4), and the results of light detection from the light-incident surfaces 25A and 26B are processed depending upon whether the optical disc being played is 2A or 2B, thereby reading the DVD or the CD.

On Page 22, the paragraph beginning at line 6:

For the astigmatism correction, there is disposed in the optical disc drive 1 the pair of the semiconductor laser diode chips 15A and 15B nearly equal in astigmatism to each other in such a manner that the deflection plane on the disc surface is parallel or perpendicular to the scanning direction of the laser beam and the sections of the laser beams are deformed in ~~a~~ the nearly same direction by the astigmatism. Therefore, the single astigmatism correction plate 50 can be used in common with the two laser beams to correct the astigmatism of each of the laser beams. Thus, the simple design of the optical disc drive 1 improves the optical property.

On Page 22, the paragraph beginning at line 15:

As mentioned above, the semiconductor laser diode chips 15A and 15B can be disposed in the optical disc drive 1 for the laser beam deflection plane to be parallel or perpendicular to the scanning direction of the laser beam, and the tracking error signal for DVD can be produced by the DPD method. Also, ~~since~~ the internal space of the optical integrated device 4 can effectively be utilized to enable a compact design of the optical integrated device 4.